



NATIONAL ENGINEERING COLLEGE
(An Autonomous Institution – Affiliated to Anna University Chennai)
K.R. NAGAR, KOVILPATTI – 628 503

SUSTAINABLE DEVELOPMENT GOALS – 13

CLIMATE ACTION





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13.1 Courses

National Engineering College (Autonomous), Kovilpatti integrates climate change and environmental sustainability into its academic curriculum through various undergraduate and postgraduate programmes. The institution equips students with the knowledge and technical skills required to address climate-related challenges. These initiatives include:

1. **Curriculum Integration:** Courses such as Environmental Engineering, Water Resources Engineering, Renewable Energy, Solid Waste Management, Disaster Management, Sustainable Construction, Environmental Science, and Green Building Concepts address climate change mitigation and adaptation.
2. **Skill Development:** Laboratory courses, field visits, mini projects, and internships provide practical exposure to climate-resilient technologies and sustainable engineering practices.
3. **Interdisciplinary Learning:** Climate-related concepts are incorporated across engineering disciplines to encourage innovative and sustainable solutions.
4. **Research-Based Learning:** Students undertake projects addressing renewable energy, water conservation, waste management, pollution control, and climate resilience.
5. **Professional Development:** Faculty members encourage participation in NPTEL, SWAYAM, workshops, and certification programmes related to climate action.



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Course Code	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY	L	T	P	E	C
23CE22C		2	0	0	0	2

COURSE OUTCOMES

Upon the successful completion of the course, the student will be able to

CO1 : Explain the functions of environment, ecosystems and biodiversity and their conservation.

CO2 : Analyze the causes, effects of environmental pollution and natural disasters.

CO3 : Apply the understanding of renewable and non-renewable resources.

CO4 : Apply the goals of sustainable development for technological and societal development.

CO5 : Demonstrate the knowledge of sustainability practices, energy cycles .

CO 1: Explain the functions of environment, ecosystems and biodiversity and their conservation

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

L:6

CO 2 Analyze the causes, effects of environmental pollution and natural disasters

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHSMS). Environmental protection, Environmental protection acts.

L:6

CO 3 Apply the understanding of renewable and non-renewable resources

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

L:6



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CO 4 Apply the goals of sustainable development for technological and societal development

Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

L:6

CO 5 Demonstrate the knowledge of sustainability practices, energy cycles

L:6

Passed in the Board of studies meeting held on 21.11.2025 & Approved in the 24th Academic Council meeting dated 13.12.2025
B.E. – Civil Engineering *R-2023 Curriculum and Syllabus*

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Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles-carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socio-economical and technological change.

TEXT BOOKS:

1. Anubha Kaushik and C.P.Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd Edition, Pearson Education, 2004.



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REGULATIONS 2023
CURRICULUM AND SYLLABUS
SEMESTER – I

S. No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Hours	Credits
				L	T	P		
Theory Courses								
1	23EN11C	Advanced Thermal Engineering	PCC	3	1	0	4	4
2	23EN12C	Research Methodology and IPR	GEN	2	0	0	2	2
3	23EN13C	Renewable Energy Sources	PCC	3	0	0	3	3
4	23EN14C	Fuels & Combustion	PCC	3	0	0	3	3
5	-	Elective – I	PEC	3	0	0	3	3
6	-	Elective – II	PEC	3	0	0	3	3
7	-	Audit Course – 1	AC	2	0	0	2	0
Practical Courses								
8	23EN15C	Energy Laboratory-I	PCC	0	0	4	4	2
Total							24	20

SEMESTER – II

S. No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Hours	Credits
				L	T	P		
Theory Courses								
1	23EN21C	Solar Energy and Utilization	PCC	3	0	0	3	3
2	23EN22C	Energy Storage Technologies	PCC	3	0	0	3	3
3	23EN23C	Green Buildings	PCC	3	0	0	3	3
4	23EN24C	Energy Conservation and Management	PCC	3	1	0	3	4
5	-	Elective – III	PEC	3	0	0	3	3
6	-	Elective - IV	PEC	3	1	0	4	4
7	-	Audit Course – 2	AC	2	0	0	2	0
Practical Courses								
8	23EN25C	Energy Laboratory-II	PCC	0	0	4	4	2
9	23EN26C	Seminar	PCC	0	0	4	4	2
Total							30	24



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PROGRAMME ELECTIVE COURSES

S. No.	Course Code	Course Title	Course Category	L	T	P	C
1.	23EN01E	Advanced Power Plant Engineering	PEC	3	0	0	3
2.	23EN02E	Advanced Thermal Storage Technologies	PEC	3	0	0	3
3.	23EN03E	Alternative Fuels	PEC	3	0	0	3
4.	23EN04E	Cogeneration and Waste Heat Recovery Systems	PEC	3	0	0	3
5.	23EN05E	Design of Heat Exchangers	PEC	3	0	0	3
6.	23EN06E	Wind Energy Technology	PEC	3	0	0	3
7.	23EN07E	Materials for Energy Applications	PEC	3	0	0	3
8.	23EN08E	Electrical Technology for Energy Systems	PEC	3	0	0	3
9.	23EN09E	Design of Experiments	PEC	3	0	0	3
10.	23EN10E	Fluidized Bed Systems	PEC	3	0	0	3
11.	23EN11E	Bio Energy Engineering	PEC	3	0	0	3
12.	23EN12E	Instrumentation and Control for Energy Systems	PEC	3	1	0	4
13.	23EN13E	Energy System Modeling and Project Management	PEC	3	0	0	3
14.	23EN14E	Solar Energy Conversion Technologies	PEC	3	0	0	3

Passed in the Board of studies meeting held on 02.12.2023 & Approved in the 20th Academic Council meeting dated 16.12.2023
M.E. – Energy Engineering R-2023 Curriculum and Syllabus

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15.	23EN15E	Thermal Energy Systems for Electrical Engineers	PEC	3	0	0	3
16.	23EN16E	Design and Optimization of Energy Systems	PEC	3	1	0	4
17.	23EN17E	Fuel Cells and Hydrogen Energy	PEC	3	0	0	3
18.	23EN18E	Electric Vehicles	PEC	3	0	0	3
19.	23EN19E	Energy Auditing	PEC	3	1	0	4
		Courses offered by other PG programs	PEC	3	0	0	3



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13.2 Centres

National Engineering College (Autonomous), Kovilpatti promotes climate action through its research centres, innovation centres, and laboratories that encourage sustainable technologies and environmental research.

1. Research laboratories support studies on environmental protection and sustainable engineering.
2. Innovation centres encourage students to develop climate-friendly technologies.
3. Centres facilitate interdisciplinary research related to renewable energy, waste management, and environmental sustainability.
4. Faculty members undertake funded research addressing climate-related challenges.
5. Students actively participate in innovation competitions focusing on sustainable development.



Solar Photovoltaic System Supporting Climate Action



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Renewable Energy System Supporting Environmental Sustainability

13.3 Extension Activities

National Engineering College (Autonomous), Kovilpatti organizes various extension activities to create awareness about climate change, environmental protection, and sustainable living among students and the community.

1. Tree plantation programmes are organized regularly to increase green cover.
2. NSS and student volunteers conduct environmental awareness campaigns in nearby villages and schools.
3. Programmes on water conservation, energy conservation, waste management, and plastic-free initiatives are conducted.
4. International Environment Day, World Water Day, Earth Day, and related observances are celebrated through awareness activities.
5. Cleanliness drives and campus greening initiatives encourage environmental responsibility.



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Eco CLUB
Advertence

WORLD RAINFOREST DAY

*Rainforests only cover around 2% the
total surface area of the Earth, but
really about 50% of the plants and animals
on the Earth live in the rainforest.
So join hands to save rainforest.*

STAND WITH NATURE TO SUCCEED FUTURE

     **ECO CLUB OF NEC**



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Date: 04.01.2024

ECO CLUB

CIRCULAR

On the occasion of **World Environment Day**, a Selfie Competition is planned by Eco Club in the topic of “Sustainable Selfie” on 6th January 2024 for our college students. In this regard, the interested students can take part in this event. Students can enroll their names through the link <https://forms.gle/EvAHX2tnC2z1Vpe89>. E-certificates will be issued to the participants.

Faculty In-Charge

[ECO CLUB]

(Dr. S. VIVEK ANAND
AP(S&H) (ECE))

Dean (SA&IR)

Principal

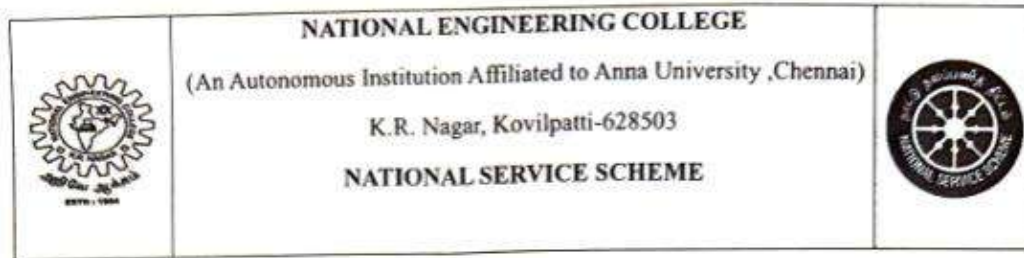
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Copy to: HODs (MECH, ECE, CSE, EEE, EIE, IT, AI & DS, Civil, Dept of S&H)

Notice board (College & Hostels)



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CIRCULAR

Date : 09.07.2026

In observance of Energy Independence Day, the National Service Scheme (NSS) Unit of National Engineering College is organizing "OFF THE GRID", an **Ideathon** on the theme "**Energy Independence in Rural Areas**". The event aims to encourage students to present practical, innovative and cost-effective solutions for achieving energy independence.

Topics :

1. Energy-Efficient Rural Housing & Buildings
2. Affordable Smart Irrigation Powered by Renewable Energy

Presentation Format (Choose Any One):

- o 5-Slide PowerPoint Presentation
- o Chart or Poster Board
- o Printed Digital Poster
- o Prototype Model

Each team should clearly present the problem, the proposed solution and the estimated low-cost budget for implementation.

Date: 11.07.2026 (Saturday)

Time: 2:00 PM – 4:00 PM

Venue: Seminar Hall, Department of ECE

Team Size: 2 Members

All interested students are invited to take part in this programme. Participants are requested to register by filling out the form provided below.

<https://forms.gle/36eJoAc41bdFGSMK8>


Secretary
[GAYATHRI G.]


NSS Programme Officer
[D.R.C. BALAMURUGAN]


Principal
9/7.



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NSS Volunteers Conducting Campus Cleanliness Drive



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13.4 Contribution to Government

National Engineering College (Autonomous), Kovilpatti contributes to government initiatives aimed at environmental conservation and climate action through academic collaboration, technical support, and community participation.

1. The institution actively participates in Government of India and Government of Tamil Nadu environmental awareness programmes.
2. NSS volunteers support government campaigns on environmental protection and sanitation.
3. Faculty members contribute technical expertise through workshops, awareness programmes, and consultancy activities.
4. Students participate in government-sponsored competitions and campaigns related to sustainable development.
5. The institution supports national initiatives promoting environmental sustainability.



Recognition for Contribution to Government Initiatives



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13.5 Projects

National Engineering College (Autonomous), Kovilpatti encourages students and faculty members to undertake projects addressing climate change mitigation, environmental sustainability, and resource conservation.

1. Student projects focus on renewable energy, green buildings, water conservation, sustainable construction, and waste management.
2. Faculty research promotes climate-resilient engineering solutions.
3. Innovation projects address environmental challenges using emerging technologies.
4. Students participate in hackathons and project competitions related to sustainable development.
5. Interdisciplinary projects contribute towards achieving the Sustainable Development Goals.

13.6 Policies

National Engineering College (Autonomous), Kovilpatti has adopted institutional policies promoting environmental sustainability and climate action across academic and administrative activities.

1. Green Campus Policy.
2. Energy Conservation Policy.
3. Water Conservation Policy.
4. Waste Management Policy.
5. Plastic-Free Campus initiatives.

These policies encourage efficient utilization of natural resources and promote environmentally responsible practices throughout the campus.



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ECO CLUB IN ASSOCIATION WITH CLIMATE ACTION UNIT

Circular

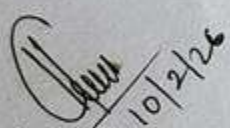
Date: 10.02.2026

The Eco Club is excited to announce the "Eco poster Competition", scheduled to be held on 14 February 2026. Let's showcase our eco-awareness and promote Eco-Conscious . And all the Students are encouraged to participate and winners were awarded. kindly enroll using the link <https://forms.gle/ZHp2ZcW7cQSF5grK6>

Note: Participants can bring their laptop

Venue: Seminar Hall Civil Department

Date & Time : 14.02.2026 at 3.30PM


Faculty In Charge
[ECO CLUB]


Principal

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Copy to: All HODs

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13.7 Commitment to Carbon Neutral University

National Engineering College (Autonomous), Kovilpatti is committed to reducing its carbon footprint by adopting environmentally sustainable practices across the campus.

1. Extensive tree plantation enhances carbon sequestration.
2. Energy-efficient LED lighting is installed across campus.
3. Water conservation and rainwater harvesting reduce resource consumption.
4. Digital administration minimizes paper usage.
5. Awareness programmes encourage sustainable transportation and responsible energy use.



National Engineering College, K.R.Nagar, Kovilpatti
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ECO CLUB



Date: 04.08.2023

Circular

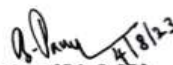
On the eve of **National Tree Day**, we planned to conduct the cleaning activity in our campus in the theme "**Clean it, Water it**" on 05.08.2023 (Saturday). In this regard, the interested students can take part in this event. Students can enroll their names through the link: <https://forms.gle/nzCNT6iSekneUj3m9>. In this regard permission may please be granted for the same

E-certificates will be issued to the participants.

Timing: 02:00 PM to 03:30 PM

Venue: In front of departments


Staff In charge
(DR. S. VINEL ARAND
APUG) (ELE)


Dean (SA & IR)

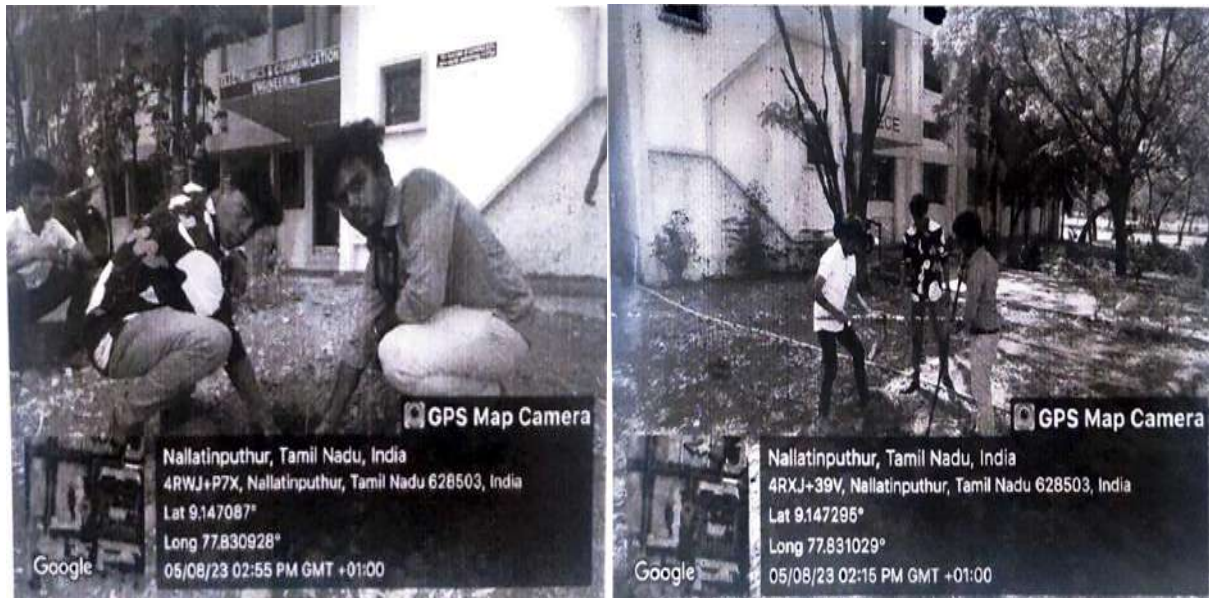

Principal

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Notice board (College & Hostel)



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Afforestation Initiative Supporting Climate Action

13.8 Climate Action Plan

National Engineering College (Autonomous), Kovilpatti promotes climate action through planned institutional initiatives aimed at reducing environmental impacts and promoting sustainability.

1. Increasing campus green cover through regular plantation drives.
2. Promoting renewable energy and energy-efficient infrastructure.
3. Implementing effective waste segregation and recycling practices.
4. Encouraging water conservation through rainwater harvesting and efficient water management.
5. Integrating climate education, research, and community outreach to build climate resilience.



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L: 45; TOTAL: 45 PERIODS

23CE16E	CLIMATE CHANGE ADAPTATION MITIGATION AND MANAGEMENT	L	T	P	E	C
		3	0	0	0	3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

COURSE OUTCOMES

Upon completion of this course, the students will be able to

CO1: Understand carbon cycle, physical basis of the natural greenhouse effect

Passed in the Board of studies meeting held on 21.11.2025 & Approved in the 24th Academic Council meeting dated 13.12.2025
B.E. – Civil Engineering *R-2023 Curriculum and Syllabus*

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- CO2: Know the growing scientific consensus established through the IPCC
- CO3: Plan climate change mitigation and adaptation projects
- CO4: Gain in-depth knowledge on climate models
- CO5: Process the model outputs for climate impact assessment

CO1: Understand carbon cycle, physical basis of the natural greenhouse effect **L: 8**

Atmosphere – weather and Climate - climate parameters – Temperature, Rainfall, Humidity,
Wind – Global ocean circulation – El Nino and its effect - Carbon cycle

CO2: Know the growing scientific consensus established through the IPCC **L: 9**

Greenhouse gases - Total carbon dioxide emissions by energy sector – industrial,
commercial, transportation, residential – Impacts – air quality, hydrology, green space -
Causes of global and regional climate change – Changes in patterns of temperature,
precipitation and sea level rise – Greenhouse effect



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CO3: Plan climate change mitigation and adaptation projects

L:9

Effects of Climate Changes on living things – health effects, malnutrition, human migration, socioeconomic impacts- tourism, industry and business, vulnerability assessment- infrastructure, population and sector – Agriculture, forestry, human health, coastal areas

CO4: Gain in-depth knowledge on climate models

L:10

IPCC Technical Guidelines for Assessing Climate Change Impact and Adaptation - Identifying adaption options – designing and implementing adaption measures – surface albedo environment-reflective roofing and reflective paving – enhancement of evapotranspiration - tree planting programme – green roofing strategies – energy conservation in buildings – energy efficiencies – carbon sequestration.

CO5: Process the model outputs for climate impact assessment

L: 9

Energy source – coal, natural gas – wind energy, hydropower, solar energy, nuclear energy, geothermal energy – biofuels – Energy policies for a cool future - Energy Audit.

TEXT BOOKS

1. Ruddiman W.F, Freeman W.H. and Company, “Earth’s Climate Past and Future”, 2001
2. Velma. I. Grover “Global Warming and Climate” Change. Vol I and II. CRC Press, 2008

REFERENCES

1. IPCC Fourth Assessment Report, Cambridge University Press, Cambridge, UK, 2007
2. Thomas E, Lovejoy and Lee Hannah “Climate Change and Biodiversity”, TERI Publishers, 2005

L: 45; TOTAL: 45 PERIODS



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23CE33E	SUSTAINABLE AND LEAN CONSTRUCTION	L	T	P	E	C
		3	0	0	0	3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

CO1 Describe the various sustainable materials used in construction.

CO2 Explain the method of estimating the amount of energy required for building.

CO3 Describe the features of LEED, TERI and GRIHA ratings of buildings.

CO4 Explain the core concepts of lean construction tools and techniques and their importance in achieving better productivity.

CO5 Apply lean tools & techniques to achieve sustainability in construction projects.

CO1: Describe the various sustainable materials used in construction 9

Introduction to sustainability and its importance – Overview of the Carbon cycle and its role in construction material: concrete and steel, etc. - CO₂ contribution from materials like cement, steel and others. - Recycled and manufactured aggregate - Role of QC and durability in sustainable construction - Life cycle assessment and sustainability metrics.

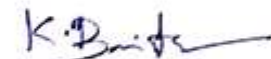
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CO2: Explain the method of estimating the amount of energy required for building 9

Components and computation of embodied energy of construction materials - Energy concept and primary energy and operational energy - Embodied energy calculations for conditioned building - Life Cycle energy use and optimization strategies.


Member


SDG Coordinator


Principal